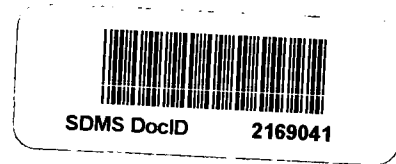




UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
1650 Arch Street
Philadelphia, Pennsylvania 19103-2029

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HAND DELIVERED

July 23, 2012



Dear [REDACTED]

EPA is writing to update you on the status of the United States Environmental Protection Agency (EPA) action at your home, and also to pass on the results of the sampling and analysis of your groundwater. This letter explains, in more detail, my phone call to you today.

EPA has decided to discontinue the provision of the alternate water supply to your home. Attached is a form that allows you to select among several alternatives on how you would like your present water supply system restored once EPA discontinues providing this alternative water supply. Please fill out the attached form and return it to the EPA Site Office, 63 Pennfield Road (a.k.a. Lehigh Street), Montrose (South Montrose), PA 18801 no later than 7 business days (August 1, 2012) from the date of this letter. You may call me at 215 341 6307 to request the form to be picked up if you prefer. If requested, EPA will then restore your water supply system according to the instruction on the form. We expect that the work will be completed by August 6, 2012.

The EPA has collected and analyzed drinking water samples from your residence located at [REDACTED]. The purpose of the sampling was to determine whether your drinking water could pose a threat to your health which could result in EPA taking an action. We previously sent you a data package, containing most of the results of our sampling. However some results were not included with that mailing. Specifically, the data being sent today is:

1. Second Round Metals Analysis Results – EPA collected a second round of samples from your home and analyzed those samples for metals.
2. Third Round Manganese Analysis Results – EPA collected samples at both taps and the well and analyzed those sample for manganese to determine the effectiveness of the treatment systems inside the mobile homes.
3. Radiological Analysis Results - The attached report gives details of the results of analytical testing performed on your well water for radiation. No unusual levels of radiation were found in your well water. However, you will note from the report that some radiation was observed, which is within normal background levels for this area of

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Pennsylvania.

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Naturally occurring radioactive substances, also known as radionuclides, are frequently found in groundwater. They are present at least to some extent in almost all rocks and soils. Radioactivity in drinking water is not a new phenomenon, but has been present to some extent since the earth was formed. So what has been found in your water is considered typical.

The EPA has established maximum contaminant levels (MCLs) for radionuclides in drinking water for community systems. The regulations for radionuclide in drinking water are the following:

- gross alpha radiation - 15 pCi/l,
- gross beta radiation - 4 mrem/year,
- combined radium-226 and radium-228 - 5 pCi/l
- total uranium - 30 ug/l.

For more Basic Information about Radionuclides in Drinking Water please go to:

<http://water.epa.gov/drink/contaminants/basicinformation/radionuclides.cfm>

4. Isotopic Analysis Results - The attached analytical results are the result of a laboratory analysis of the gas collected from the groundwater to determine its origin or age. The process determines the presence and quantity of different isotopes of carbon, hydrogen and oxygen. Isotopes are variations of an element due to a slightly different atomic structure, such as a lesser or greater number of neutrons. By measuring the ratio of one isotope of carbon, hydrogen and oxygen against other isotopes of the same element, and comparing this data against other samples collected from gas samples of known origins, such as a gas production well, the age or origin of the gas can be determined. In a sense, what is being performed is a "finger print" of the gas sample. Gas from different locations in the earth exhibit different characters that are somewhat unique; thus, performing this type of "finger printing" may allow scientists to identify the origin or age of a gas present in the groundwater. Please note that isotopic analysis results do not provide any direct information on the water quality of well water and whether that water could present a health concern. For more information on how isotopic analysis is performed and applied you might want to read the paper "Stable Isotope Analysis and Human Diet". It is available at the following website:
<http://luna.cas.usf.edu/~rtykot/10%20Tykot.pdf>
5. Lithium re-analysis results - As scientists at EPA were evaluating the initial lithium data, it was decided to re-analyze for lithium at a lower detection limit. That data for your drinking water sample, analyzed at the lower detection limit, is provided in the attached data package.

The enclosed package provides results for the drinking water samples collected at your residence for the categories listed above. Also enclosed you will find information on how to read the results. EPA will be releasing our data to the general public. EPA will appropriately safeguard all personally identifiable information in its possession, including your name and address.

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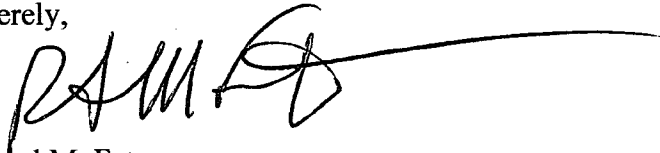
Attached is a Technical Recommendation document which you may consider regarding the treatment of your well. These recommendations are based upon EPA's knowledge of your water supply system to date. If you should have any questions regarding this document or the recommendations, please contact me.

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If you have individual health questions about your data, please contact the Agency for Toxic Substances and Disease Registry (ATSDR). Lora Werner, Senior Regional Representative of ATSDR can be reached at 215-814-3141 or via email at lkw9@cdc.gov.

Additional information regarding this site can be found at www.epa.gov/arweb or www.epaossc.org/dimock. If you should have any additional site questions other the health questions referenced above, please contact the site community involvement coordinator, Trish Taylor at 215-814-5539.

Sincerely,



Richard M. Fetzer
On-Scene Coordinator

Customer Service Hotline: 1-800-438-2474

Lab #: 235492 Job #: 17407
 Sample Name/Number: HW08a
 Company: TechLaw, Inc.
 Date Sampled: 1/25/2012
 Container: Dissolved Gas Bottle
 Field/Site Name: A3TA
 Location:
 Formation/Depth:
 Sampling Point:
 Date Received: 2/03/2012 Date Reported: 2/20/2012

Component	Chemical mol. %	$\delta^{13}\text{C}$ ‰	δD ‰	$\delta^{18}\text{O}$ ‰
Carbon Monoxide -----	nd			
Hydrogen Sulfide -----	na			
Helium -----	na			
Hydrogen -----	nd			
Argon -----	0.746			
Oxygen -----	5.31			
Nitrogen -----	36.31			
Carbon Dioxide -----	3.22			
Methane -----	53.64	-36.58	-209.9	
Ethane -----	0.767	-35.9	-189	
Ethylene -----	nd			
Propane -----	0.0030			
Propylene -----	nd			
Iso-butane -----	nd			
N-butane -----	nd			
Iso-pentane -----	nd			
N-pentane -----	nd			
Hexanes + -----	nd			
Water -----			-61.0	-9.20

Total BTU/cu.ft. dry @ 60deg F & 14.73psia, calculated: 557

Specific gravity, calculated: 0.774

Remarks:

Analysis is of gas extracted from water by headspace equilibration. Analysis has been corrected for helium added to create headspace. Helium dilution factor = 0.67

*Addition of helium negates the ability to detect native helium and may negate the ability to detect hydrogen.

** Ethane isotopes obtained online via GC-C-IRMS. Added to the report on 4/26/2012.

nd = not detected. na = not analyzed. Isotopic composition of hydrogen is relative to VSMOW. Isotopic composition of carbon is relative to VPDB. Isotopic composition of oxygen is relative to VSMOW, except for carbon dioxide which is relative to VPDB. Calculations for BTU and specific gravity per ASTM D3588. Chemical compositions are normalized to 100%. Mol. % is approximately equal to vol. %.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
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1650 Arch Street
Philadelphia, Pennsylvania 19103-2029

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SUBJECT: Toxicological Review of HW08A Data (R2) 2 July 2012
Dimock, PA

FROM: Dawn A. Ioven, toxicologist
Technical Support Branch (3HS41)

TO: Rich Fetzer, OSC
Eastern Response Branch (3HS31)

On 24 May 2012, U.S. EPA collected a second round of samples from HW08A in Dimock. These samples were collected only from the wellhead, not the tap, because an alternate water supply is provided at this location. The samples were analyzed for 27 inorganic constituents; analytical results were validated and compared to risk-based screening levels and/or standards for public drinking water supplies. Findings in excess of these comparison concentrations are presented below.

Chromium

Chromium was detected in unfiltered and filtered wellhead samples at respective concentrations of 5.3 and 4.6 ug/L. The risk-based screening level for the most toxic form of chromium (hexavalent) is 3.1 ug/L. The concentrations observed in HW08A slightly exceed this value, yielding an excess cancer risk in the 1.5E-04 range. Note, however, that the form of chromium detected in this sample is not known. If the reported concentrations represent the much less toxic trivalent form of chromium (with a risk-based screening level of 16,000 ug/L), then there is no risk associated with exposure.

A point worth mentioning is that samples collected from HW08A on 25 January 2012 (unfiltered and filtered) contained no detectable chromium.

Manganese

Manganese was detected in wellhead samples from HW08A at concentrations of 942 ug/L (unfiltered) and 915 ug/L (filtered). The risk-based screening level for manganese is 320 ug/L (at a Hazard Quotient of 1). Additionally, a non-enforceable drinking water standard of 50 ug/L exists for manganese. This standard is based on aesthetic considerations, such as taste and smell, rather than adverse health endpoints.

During the 25 January 2012 sampling event, manganese was detected at levels well below risk-based triggers, 64.3 ug/L (unfiltered) and 64 ug/L (filtered).

No other constituents were detected at levels of concern in HW08A.



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HW-08a EPA Validated Data Summary Report Dimock Residential Sampling Sample Date: 5/23/2012

Sample Number	Analyte	Result	Trigger Levels	EPA Primary MCLs	EPA Secondary MCLs	DEP Primary MCLs	DEP Secondary MCLs
HW08a_R2	Aluminum	35.00 ug/L	16,000.00 ug/L		200.00 ug/L		200.00 ug/L
HW08a-F_R2	Aluminum	30.00 U ug/L	16,000.00 ug/L		200.00 ug/L		200.00 ug/L
HW08a_R2	Antimony	2.00 U ug/L	6.00 ug/L	6.00 ug/L		6.00 ug/L	
HW08a-F_R2	Antimony	2.00 U ug/L	6.00 ug/L	6.00 ug/L		6.00 ug/L	
HW08a_R2	Arsenic	1.00 U ug/L	4.50 ug/L	10.00 ug/L		10.00 ug/L	
HW08a-F_R2	Arsenic	1.00 U ug/L	4.50 ug/L	10.00 ug/L		10.00 ug/L	
HW08a_R2	Barium	64.10 ug/L	2,900.00 ug/L	2,000.00 ug/L		2,000.00 ug/L	
HW08a-F_R2	Barium	61.40 ug/L	2,900.00 ug/L	2,000.00 ug/L		2,000.00 ug/L	
HW08a_R2	Beryllium	1.00 U ug/L	16.00 ug/L	4.00 ug/L		4.00 ug/L	
HW08a-F_R2	Beryllium	1.00 U ug/L	16.00 ug/L	4.00 ug/L		4.00 ug/L	
HW08a_R2	Boron	50.00 U ug/L	3,100.00 ug/L				
HW08a-F_R2	Boron	50.00 U ug/L	3,100.00 ug/L				
HW08a_R2	Cadmium	1.00 U ug/L	6.90 ug/L	5.00 ug/L		5.00 ug/L	
HW08a-F_R2	Cadmium	1.00 U ug/L	6.90 ug/L	5.00 ug/L		5.00 ug/L	
HW08a_R2	Calcium	23,100.00 ug/L					
HW08a-F_R2	Calcium	22,700.00 ug/L					
HW08a_R2	Chromium	5.30 ug/L	3.10 ug/L	100.00 ug/L		100.00 ug/L	
HW08a-F_R2	Chromium	4.60 ug/L	3.10 ug/L	100.00 ug/L		100.00 ug/L	
HW08a_R2	Cobalt	1.00 U ug/L	4.70 ug/L				
HW08a-F_R2	Cobalt	1.00 U ug/L	4.70 ug/L				
HW08a_R2	Copper	19.90 ug/L	620.00 ug/L	1,300.00 ug/L**	1,000.00 ug/L	1,000.00 ug/L***	
HW08a-F_R2	Copper	2.00 U ug/L	620.00 ug/L	1,300.00 ug/L**	1,000.00 ug/L	1,000.00 ug/L***	
HW08a_R2	Iron	121.00 ug/L	11,000.00 ug/L		300.00 ug/L		300.00 ug/L
HW08a-F_R2	Iron	143.00 ug/L	11,000.00 ug/L		300.00 ug/L		300.00 ug/L

See end of document for report key

19-Jul-12

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REF

Sample Number	Analyte	Result	Trigger Levels	EPA Primary MCLs	EPA Secondary MCLs	DEP Primary MCLs	DEP Secondary MCLs
HW08a_R2	Lead	4.60 ug/L	15.00 ug/L	15.00 ug/L**		5.00 ug/L***	
HW08a-F_R2	Lead	1.00 U ug/L	15.00 ug/L	15.00 ug/L**		5.00 ug/L***	
HW08a_R2	Lithium	25.00 U ug/L	31.00 ug/L				
HW08a-F_R2	Lithium	25.00 U ug/L	31.00 ug/L				
HW08a_R2	Magnesium	5,310.00 ug/L					
HW08a-F_R2	Magnesium	5,220.00 ug/L					
HW08a_R2	Manganese	942.00 ug/L	320.00 ug/L		50.00 ug/L		50.00 ug/L
HW08a-F_R2	Manganese	915.00 ug/L	320.00 ug/L		50.00 ug/L		50.00 ug/L
HW08a_R2	Nickel	1.70 ug/L	300.00 ug/L				
HW08a-F_R2	Nickel	1.90 ug/L	300.00 ug/L				
HW08a_R2	Potassium	2,000.00 U ug/L					
HW08a-F_R2	Potassium	2,000.00 U ug/L					
HW08a_R2	Selenium	5.00 U ug/L	78.00 ug/L	50.00 ug/L		50.00 ug/L	
HW08a-F_R2	Selenium	5.00 U ug/L	78.00 ug/L	50.00 ug/L		50.00 ug/L	
HW08a_R2	Sodium	3,870.00 ug/L	20,000.00 ug/L				
HW08a-F_R2	Sodium	3,840.00 ug/L	20,000.00 ug/L				
HW08a_R2	Strontium	200.00 U ug/L	9,300.00 ug/L				
HW08a-F_R2	Strontium	200.00 U ug/L	9,300.00 ug/L				
HW08a_R2	Thallium	1.00 U ug/L	0.16 ug/L	2.00 ug/L		2.00 ug/L	
HW08a-F_R2	Thallium	1.00 U ug/L	0.16 ug/L	2.00 ug/L		2.00 ug/L	
HW08a_R2	Tin	200.00 U ug/L	9,300.00 ug/L				
HW08a-F_R2	Tin	200.00 U ug/L	9,300.00 ug/L				
HW08a_R2	Titanium	200.00 U ug/L					
HW08a-F_R2	Titanium	200.00 U ug/L					
HW08a_R2	Uranium	1.30 J+ ug/L	47.00 ug/L	30.00 ug/L		30.00 ug/L	
HW08a-F_R2	Uranium	1.40 J+ ug/L	47.00 ug/L	30.00 ug/L		30.00 ug/L	
HW08a_R2	Vanadium	5.00 U ug/L	78.00 ug/L				
HW08a-F_R2	Vanadium	5.00 U ug/L	78.00 ug/L				
HW08a_R2	Zinc	21.30 ug/L	4,700.00 ug/L		5,000.00 ug/L		5,000.00 ug/L

See end of document for report key

19-Jul-12

Page 2 of 3

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Sample Number	Analyte	Result	Trigger Levels	EPA Primary MCLs	EPA Secondary MCLs	DEP Primary MCLs	DEP Secondary MCLs
HW08a-F_R2	Zinc	8.30 ug/L	4,700.00 ug/L		5,000.00 ug/L		5,000.00 ug/L

Sample Number – Code that is used to identify the particular sample. See additional information below:

HW## – Identifies the sample location and indicates that it was collected at well head or closest point to the well head.

F – Indicates that the sample was filtered following collection. The purpose of filtering the sample is to remove any particulates in order to find what metals are actually dissolved in the water sample.

A/B – Designates which residence the sample was collected for sample locations with multiple residences using the same water source (may be a well or a spring).

_R2 - Designated the second round of sampling for this particular sampling location.

Analyte – General term for a substance in the sample. The lab does testing to find specific analytes, or substance in the water sample. The report lists each analyte that the lab tested for and what amounts were found.

Result and Units – identifies the actual result for the particular analyte and the measurement used for the particular type of sample. The results may include the following units for the various water sample analyses:

µg /L – Micrograms per liter (abbreviated as µg /L) measurements of the mass of the substance per liter of water. This measurement is commonly known as parts per billion or ppb. Drinking water results are usually reported in µg /L.

Trigger Level – established for this project, the trigger levels are based on risk-based screening levels and/or standards for public water supplies. A yellow highlighted result represents an analytical result greater than the established trigger level. Results exceeding a trigger level are referred to an EPA toxicologist for further review. EPA Primary MCLs – the primary maximum contaminant levels (MCLs) are legally enforceable standards established under the Safe Drinking Water Act to protect public health by limiting the levels of contaminants in public drinking water systems. The MCL is the amount of an analyte (substance) that can be present in a water sample that the government considers acceptable to drink. EPA considers the MCLs when evaluating results from residential drinking water wells.

EPA Secondary MCLs - secondary MCLs are non-enforceable standards regulating contaminants that may cause cosmetic effects (such as skin or tooth discoloration) or aesthetic effects (such as taste, odor, or color) in drinking water. EPA recommends secondary standards to public water systems, but does not require systems to comply. However, states may choose to adopt them as enforceable standards.

DEP MCLs (Primary and Secondary) – Chapter 109, Pennsylvania Safe Drinking Water Regulations, defines MCL as the maximum permissible level of a contaminant in water which is delivered to a user of a public water system, and includes the primary and secondary MCLs established under the Federal Safe Drinking Water Act, and MCLs adopted under the act.

Validation Result Qualifiers - EPA performs a quality check on the lab results. After this quality check, EPA may mark the measurement of certain analytes with a qualifier to give additional information about the measurement. This information can apply to 1) how certain EPA is that the lab detected the analyte and 2) how certain EPA is of the measurement of the analyte once detected. If there is no qualifier by the result, the detection and measurement of the analyte are certain

U – Indicates that the analyte was not detected. If there is a number next to the U, this number is the amount of analyte that would have to be present to be detected by the lab given the particular method and/or instrumentation.

J – This means that the analyte was detected, but the value of the result is an estimate.

J+ - The result is an estimated quantity, but the result may be biased high.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
1650 Arch Street
Philadelphia, Pennsylvania 19103-2029

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SUBJECT: Toxicological Review of HW08A Data 19 July 2012
Dimock, PA

FROM: Dawn A. Ioven, toxicologist
Technical Support Branch (3HS41)

TO: Rich Fetzer, OSC
Eastern Response Branch (3HS31)

On 3 July 2012, U.S. EPA collected samples from HW08A in Dimock. These samples were collected from the wellhead and tap, and analyzed for manganese. (Note that this residence has a pre-existing treatment system and also receives bulk water as an alternate supply.) Analytical results were validated and compared to risk-based screening levels and/or standards for public drinking water. Findings are presented below.

Manganese

Unfiltered and filtered wellhead samples contained manganese at 1150 to 1170 ug/L. Manganese was observed in tap samples at much lower concentrations, 176 ug/L (unfiltered) and 132 ug/L (filtered). The risk-based screening level for manganese is 320 ug/L (at a Hazard Quotient of 1). Additionally, a non-enforceable drinking water standard of 50 ug/L exists for manganese; this standard is based on aesthetic considerations, such as taste and smell, rather than adverse health endpoints. Since tap concentrations are less than the risk-based comparison criterion (320 ug/L), no detrimental effects associated manganese are expected at HW08A.

Note that the July 2012 wellhead results for HW08A are consistent with data collected in May 2012, where manganese was detected in wellhead samples at concentrations of 942 ug/L (unfiltered) and 915 ug/L (filtered). During the 25 January 2012 sampling event, however, manganese was reported at levels well below risk-based triggers, 64.3 ug/L (unfiltered) and 64 ug/L (filtered).



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HW-08a EPA Validated Data Summary Report Dimock Residential Sampling Sample Date: 7/3/2012

Sample Number	Analyte	Result	Trigger Levels	EPA Primary MCLs	EPA Secondary MCLs	DEP Primary MCLs	DEP Secondary MCLs
HW08a_R3	Manganese	1,170.00 ug/L	320.00 ug/L		50.00 ug/L		50.00 ug/L
HW08a-F_R3	Manganese	1,150.00 ug/L	320.00 ug/L		50.00 ug/L		50.00 ug/L
HW08a-P_R3	Manganese	176.00 ug/L	320.00 ug/L		50.00 ug/L		50.00 ug/L
HW08a-PF_R3	Manganese	132.00 ug/L	320.00 ug/L		50.00 ug/L		50.00 ug/L
HW08az_R3	Manganese	1,150.00 ug/L	320.00 ug/L		50.00 ug/L		50.00 ug/L
HW08az-F_R3	Manganese	1,160.00 ug/L	320.00 ug/L		50.00 ug/L		50.00 ug/L

Sample Number – Code that is used to identify the particular sample. See additional information below:

HW## – Identifies the sample location and indicates that it was collected at well head or closest point to the well head.

F – Indicates that the sample was filtered following collection. The purpose of filtering the sample is to remove any particulates in order to find what metals are actually dissolved in the water sample.

Z – Identifies a duplicate sample. Duplicate samples are collected for every ten samples collected to test the reproducibility of sampling and analytical procedures.

P – Indicates that the sample was collected at the kitchen tap. In some cases this may be following any treatment that the residence may have.

A/B – Designates which residence the sample was collected for sample locations with multiple residences using the same water source (may be a well or a spring).

_R3 - Designated the third round of sampling at the wellhead and first round of sampling at the kitchen tap for this particular sampling location.

Analyte – General term for a substance in the sample. The lab does testing to find specific analytes, or substance in the water sample. The report lists each analyte that the lab tested for and what amounts were found.

Result and Units – identifies the actual result for the particular analyte and the measurement used for the particular type of sample. The results may include the following units for the various water sample analyses:

µg /L – Micrograms per liter (abbreviated as µg /L) measurements of the mass of the substance per liter of water. This measurement is commonly known as parts per billion or ppb. Drinking water results are usually reported in µg /L.

Trigger Level – established for this project, the trigger levels are based on risk-based screening levels and/or standards for public water supplies. A yellow highlighted result represents an analytical result greater than the established trigger level. Results exceeding a trigger level are referred to an EPA toxicologist for further review.

EPA Primary MCLs – the primary maximum contaminant levels (MCLs) are legally enforceable standards established under the Safe Drinking Water Act to protect public health by limiting the levels of contaminants in public drinking water systems. The MCL is the amount of an analyte (substance) that can be present in a water sample that the government considers acceptable to drink. EPA considers the MCLs when evaluating results from residential drinking water wells.

EPA Secondary MCLs - secondary MCLs are non-enforceable standards regulating contaminants that may cause cosmetic effects (such as skin or tooth discoloration) or aesthetic effects (such as taste, odor, or color) in drinking water. EPA recommends secondary standards to public water systems, but does not require systems to comply. However, states may choose to adopt them as enforceable standards.

DEP MCLs (Primary and Secondary) – Chapter 109, Pennsylvania Safe Drinking Water Regulations, defines MCL as the maximum permissible level of a contaminant in water which is delivered to a user of a public water system, and includes the primary and secondary MCLs established under the Federal Safe Drinking Water Act, and MCLs adopted under the act.

See end of document for report key

20-Jul-12

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
1650 Arch Street
Philadelphia, Pennsylvania 19103-2029

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SUBJECT: Toxicological Review of Radiological Data 20 July 2012
Dimock, PA

FROM: Dawn A. Ioven, toxicologist
Technical Support Branch (3HS41)

TO: Rich Fetzer, OSC
Eastern Response Branch (3HS31)

U.S. EPA recently collected samples from 61 homewells in Dimock, PA: HW01, HW02, HW03, HW04, HW05, HW06, HW07, HW08a, HW09, HW11, HW12, HW13, HW14, HW15a, HW16, HW17, HW18, HW19, HW20, HW21, HW22, HW23, HW24, HW25, HW26, HW27, HW28a, HW28b, HW29, HW30, HW31, HW32, HW33a, HW33b, HW34a, HW35, HW36N, HW38, HW39, HW40, HW41, HW42, HW43, HW44, HW45, HW46, HW47, HW48, HW49, HW50, HW51, HW52, HW53, HW54, HW55, HW56, HW57, HW58, HW59, HW60, HW61, HW62, HW63 and HW64. These samples were specifically analyzed for *radionuclides*; the presence or absence of *chemical* substances was assessed and reported separately. Analytical results were validated and compared to risk-based screening levels (set at an excess cancer risk of $1E-04$); the screening levels were derived using U.S. EPA's Preliminary Remediation Goal Calculator for Radionuclides (http://epa-prgs.ornl.gov/cgi-bin/radionuclides/rprg_search) and/or standards for public drinking water supplies (<http://water.epa.gov/drink/contaminants/index.cfm#>).

No radionuclides were detected in excess of trigger concentrations, as described above, in any sample from any well. Given these observations, radionuclides are not expected to pose a health risk in the sampled homewells.



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Radiation Analysis of Groundwater Information - Dimock

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What is radioactivity?

Radioactivity is the spontaneous emission of energy from unstable atoms. The energy that is released in the process is made up of small, fast-moving particles and high-energy waves. These emissions are typically alpha and beta particles and gamma rays.

What is a radionuclide?

Radionuclides are radioactive isotopes or unstable forms of elements. Radioactivity is the release of energy in the form of gamma rays and energetic particles (alpha and beta particles) that occurs when unstable elements decompose to form more stable elements. The process by which an element changes from an unstable state to a more stable state by emitting radiation is called radioactive decay. Gamma rays, alpha particles, and beta particles, which are given off by radioactive decay, have very different properties but are all ionizing radiation each is energetic enough to break chemical bonds, thereby possessing the ability to damage or destroy living cells.

(Naturally Occurring Radionuclides in the Ground Water of Southeastern Pennsylvania. USGS. <http://pa.water.usgs.gov/reports/fs012-00.html>)

What radionuclides are regulated in drinking water and what are their health effects?

Contaminant	MCL (year promulgated)	Source	Health Effect
Combined radium 226/228	5 pCi/L (1976)	Naturally occurs in some drinking water sources.	Some people who drink water containing radium 226 or 228 in excess of the MCL over many years may have an increased risk of getting cancer.
Adjusted) Gross Alpha.	15 pCi/L (not including radon or uranium) (1976)	Naturally occurs in some drinking water sources	Some people who drink water containing alpha emitters in excess of the MCL over many years may have an increased risk of getting cancer.
Beta Particle and Photon Radioactivity	4 mrem/year (look up table) (1976)	May occur due to contamination from facilities using or producing radioactive materials.	Some people who drink water containing beta and photon emitters in excess of the MCL over many years may have an increased risk of getting cancer.
Uranium	30 µg/L (2000)	Naturally occurs in some drinking water sources.	Exposure to uranium in drinking water may result in toxic effects to the kidney. Some people who drink water containing alpha emitters in excess of the MCL over many years may have an increased risk of getting cancer.

Why are there standards for some but not all radionuclides?

There are more than 3,000 known radionuclides of which very few are commonly found in groundwater. Maximum Contaminant Levels (MCLs) were established to cover the radionuclides typically encountered in groundwater. MCLs were established for radium and uranium since they are far and away the most commonly encountered. General radiation measurements such as alpha, beta and gamma levels were established to identify potential threats posed by other radionuclides for which no MCLs were established.

Other radionuclides analyzed during this project were compared to trigger numbers developed using Preliminary Remediation Goals for Radionuclide calculator. (PRG calculator) PRG calculator numbers are screening levels.

<http://www.epa.gov/superfund/health/contaminants/radiation/pdfs/sstbd.pdf>.

Can drinking water be contaminated by man-made radionuclides?

A very small percentage of drinking water systems are located in areas that have potential sources of man-made radioactive contamination from facilities that use, manufacture, or dispose of radioactive substances. Drinking water contamination may occur through accidental releases of radioactivity or through improper disposal practices. Water systems that are vulnerable to this type of contamination are required to perform extensive monitoring for radioactive contamination to ensure that their drinking water is safe. These radionuclides are regulated under the "beta particle and photon radioactivity" standard.

<http://water.epa.gov/lawsregs/rulesregs/sdwa/radionuclides/basicinformation.cfm>

Analytical Reports, Equipment and Methods

Spectroscopy is the use of the absorption, emission, or scattering of electromagnetic radiation by matter to qualitatively or quantitatively study the matter or to study physical processes. The matter can be atoms, molecules, atomic or molecular ions, or solids.

<http://www.files.chem.vt.edu/chem-ed/spec/spectros.html>

Alpha Particle Spectroscopy - AS - refers to, which is a method of measuring alpha particles.

Gamma Ray Spectroscopy - GS - refers to, which is a method of measuring gamma radiation.

Radionuclide Specific Activity - RS - is a measurement of the amount of radioactivity, or the decay rate, of a particular radionuclide per unit mass or volume of the radionuclide.

What is the Minimum Detectable Concentration (MDC)?

The MDC is the net concentration (in this case radiological activity) that has a specified chance of being detected. It is an estimate of the detection capability of a measuring protocol and is calculated before measurements are taken. The detection limit is the lowest net response level, in counts, that you expect to be seen with a fixed level of certainty, customarily 95%. The MDC is

the detection limit expressed as an activity concentration. If the activity concentration in a sample is equal to the MDC, then there is a 95% chance that radioactive material in the sample will be detected.

(http://www.marssim.com/Technical_Questions.htm#faq3_1)

What does 2σ (two sigma) mean?

A statistical expression that states that approximately 95% of the population lies within two standard deviations of the mean.

What is Uncertainty?

Used in the context of the analytical reports, uncertainty is the measurement of total error associated with the counting and measuring process.

Why is the Uranium MCL provided in a concentration (ug/l) rather than radioactivity (pCi)?

Uranium's chemical toxicity is a higher concern than its radioactivity.

What is a pCi/L (picocurie per liter)?

When we measure the amount of radiation in the environment, what is actually being measured is the rate of radioactive decay, or activity. The rate of decay varies widely among radioactive elements. For that reason, one gram of a radioactive substance that decays rapidly may contain the same amount of activity as several tons of another radioactive substance that decays slowly. Activity commonly is expressed in a unit of measure known as a curie. One curie equals 3.7×10^{10} (37,000,000,000) atomic disintegrations per second. Activity in water is expressed in units of picocuries per liter (pCi/L), where 1 pCi/L is equal to 2.2 radioactive disintegrations per minute per liter of water.

(<http://pa.water.usgs.gov/reports/fs012-00.html>)

Other Sources of Information on Radiation

EPA

<http://www.epa.gov/radiation/>

Agency for Toxic Substances and Disease Registry

<http://www.atsdr.cdc.gov/phs/phs.asp?id=482&tid=86>

Health Physics Society

http://hps.org/documents/environmental_radiation_fact_sheet.pdf

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HW-08a
EPA Radiological Data Summary Report
Dimock Residential Sampling
Sample Date: 1/25/2012

Sample Number	Analyte	Result	2σ Uncertainty	MDC	Unit	Trigger Level	EPA / DEP Primary MCL
HW08a	Alpha	9.65E-01 UJ	1.50E+00	1.10E+00	pCi/L		1.50E+01 pCi/L
HW08a	Beta	2.24E+00	1.30E+00	1.90E+00	pCi/L		
HW08a	Th227-AS	-1.62E-02 U	5.60E-02	1.60E-01	pCi/L		
HW08a	Th228-AS	7.20E-02 U	8.00E-02	1.20E-01	pCi/L	4.90E+01 pCi/L	
HW08a	Th230-AS	4.66E-02 UJ	5.80E-02	7.30E-02	pCi/L	5.80E+01 pCi/L	
HW08a	Th232-AS	0.00E+00	2.70E-02	5.50E-02	pCi/L	5.20E+01 pCi/L	
HW08a	U234-AS	1.89E-01 J	1.10E-01	7.90E-02	pCi/L	7.50E+01 pCi/L	
HW08a	U235-AS	2.77E-02 UJ	6.00E-02	9.50E-02	pCi/L	7.60E+01 pCi/L	
HW08a	U238-AS	5.54E-02 UJ	6.30E-02	6.00E-02	pCi/L	8.30E+01 pCi/L	
HW08a	Bi212-GS	4.64E+00 U	1.20E+01	2.00E+01	pCi/L	7.45E+03 pCi/L	
HW08a	Bi214-GS	3.51E+02 UJ, J*	2.90E+02	4.50E+02	pCi/L	2.76E+04 pCi/L	
HW08a	K40-GS	-4.24E+00 UJ	1.40E+01	1.90E+01	pCi/L	2.14E+02 pCi/L	
HW08a	Pa234m-GS	1.14E+02	8.50E+01	1.30E+02	pCi/L		
HW08a	Pb214-GS	1.04E+02 U, J*	3.70E+02	6.40E+02	pCi/L		
HW08a	Ra226-GS	3.88E-01 U, J*	3.00E+01	5.10E+01	pCi/L		
HW08a	Ra228-GS	-2.93E-02 U	2.90E+00	5.60E+00	pCi/L		
HW08a	Th234-GS	-1.76E+02 UJ	9.70E+05	4.20E+02	pCi/L	2.29E+02 pCi/L	
HW08a	U235-GS	-5.99E+00 UJ, J*	1.10E+01	1.80E+01	pCi/L	7.60E+01 pCi/L	
HW08a	Ra226-RS	9.29E-02 UJ	8.90E-02	9.40E-02	pCi/L		
HW08a	Ra228-RS	2.38E-01 U	4.60E-01	7.70E-01	pCi/L		
HW08a	Ra226 + Ra228	3.31E-01			pCi/L	5.00E+00 pCi/L	5.00E+00 pCi/L
HW08a	Total Uranium	1.78E-01			ug/L	4.70E+01 ug/L	3.00E+01 ug/L

See end of document for report key

19-Jul-12

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Sample Number – Code that is used to identify the particular sample. See additional information below:

HW## – Identifies the sample location and indicates that it was collected at well head or closest point to the well head.

Z – Identifies a duplicate sample. Duplicate samples are collected for every ten samples collected to test the reproducibility of sampling and analytical procedures.

P – Indicates that the sample was collected at the kitchen tap. In some cases this may be following any treatment that the residence may have.

A/B – Designates which residence the sample was collected for sample locations with multiple residences using the same water source (may be a well or a spring).

Analyte – General term for a substance in the sample. The lab does testing to find specific analytes, or substances in the water sample. The report lists each analyte that the lab tested for and what amounts were found. The analytes in the attached report includes radionuclides.

-AS Alpha Particle Spectroscopy, which is a method of measuring alpha particles

-GS Gamma Ray Spectroscopy, refers to Gamma Ray Spectroscopy, which is a method of measuring gamma radiation

-RS Radionuclide Specific Activity, is a measurement of the amount of radioactivity or the decay rate of a particular radionuclide per unit mass or volume of the radionuclide

Ra226 + Ra228 is a combined result of specific radionuclides for direct comparison with the combined MCL in drinking water of 5 pCi/L

Total Uranium U (ug/L) - estimate calculated based on Uranium alpha spectrometry results and uranium isotopic specific activity. Calculated by:

Total U (ug/L) = (U-234 pCi/L)/(6254) + (U-235 pCi/L)/(2.163) + (U-238 pCi/L)/(0.3362)

Result and Units – identifies the actual result for the particular analyte and the measurement used for the particular type of sample. Results are expressed in scientific notation. For example: 4.32E+03 = 4,320; 2.75E-02 = 0.0275

The results include the following units for radionuclide water sample analyses:

pCi/L - picocuries per liter; measurements of the radioactive decay or activity. Activity in water is expressed in units of picocuries per liter.

ug/L - micrograms per liter; measurements of the mass of the substance per liter of water. This measurement is commonly known as parts per billion or ppb.

Drinking water results are usually reported in micrograms per liter.

MDC - Minimal detectable concentration, expressed as an activity concentration. If the result is equal to the MDC, there is a 95% chance that the radionuclide analyte will be detected in the sample.

Uncertainty - Measurement of total error associated with the counting/measuring process. The uncertainty is expressed as two standard deviations (two sigma [σ]) of the mean.

Trigger Level – established for this project, the trigger levels are based on risk-based screening levels and/or standards for public water supplies. A yellow highlighted result represents an analytical result greater than the established trigger level. Results exceeding a trigger level are referred to an EPA toxicologist for further review.

EPA Primary MCLs – the primary maximum contaminant levels (MCLs) are legally enforceable standards established under the Safe Drinking Water Act to protect public health by limiting the levels of contaminants in public drinking water systems. The MCL is the amount of an analyte (substance) that can be present in a water sample that the government considers acceptable to drink. EPA considers the MCLs when evaluating results from residential drinking water wells.

DEP Primary MCLs – Chapter 109, Pennsylvania Safe Drinking Water Regulations, defines MCL as the maximum permissible level of a contaminant in water which is delivered to a user of a public water system, and includes the primary and secondary MCLs established under the Federal Safe Drinking Water Act, and MCLs

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Validation Result Qualifiers - EPA performs a quality check on the lab results. This quality check evaluates the sample results at the 95% confidence level (the 2σ counting uncertainty). This information can apply to 1) how certain EPA is that the lab detected the analyte and 2) how certain EPA is of the measurement of the analyte once detected. If there is no qualifier by the result, the sample result is greater than its MDC and/or greater than its 2σ counting uncertainty.

U – The sample result is less than its MDC (the data user is accepting a 5% probability of a false negative result) and the sample result is less than its 2σ counting uncertainty.

J – This means that the analyte was detected, but the value of the result is an estimate.

J* - Laboratory indicates that this result may be significantly under or overestimated. Pb-214 and Bi-214 activity concentrations should be considered a gross estimate only. According to the laboratory performing the analyses, the half life for Rn-222 (3.842 days) was utilized to calculate activity and decay corrected to the individual sample collection date/time.

UJ - The U before the J means that the analyte was close to the MDC, however, some analyte may be present.

R – Indicates that the data has been rejected. Calculated negative results indicate that the activity is at or below the instrument background. Results are less than the 95% confidence interval MDC value.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
1650 Arch Street
Philadelphia, Pennsylvania 19103-2029

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SUBJECT: Lithium Reanalysis
Dimock, PA

FROM: Dawn A. Ioven, toxicologist
Technical Support Branch (3HS41)

TO: Rich Fetzer, OSC
Eastern Response Branch (3HS31)

5 July 2012

Samples initially collected from residential wells in Dimock during Weeks 1 through 4 were recently reanalyzed to achieve lower detection limits (DLs) for lithium. For the following homewells, lithium was either 1) not detected (DL = 25 ug/L) or 2) detected at levels below the risk-based screening level for a long-term residential exposure scenario (31 ug/L):

HW03, HW04, HW07, HW08a, HW09, HW11, HW13, HW14, HW19, HW20, HW21, HW23, HW27, HW28a, HW28b, HW32, HW33a, HW33b, HW35, HW36, HW38, HW40, HW41, HW42, HW43, HW44, HW45, HW46, HW48, HW49, HW51, HW52, HW53, HW54, HW55, HW57, HW58, and HW59

Based on these findings, no risks associated with exposure to lithium are expected in the homewells listed above.



*Printed on 100% recycled/recyclable paper with 100% post-consumer fiber and process chlorine free.
Customer Service Hotline: 1-800-438-2474*

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HW-08a EPA Data Summary Report Dimock Residential Sampling

Sample Number	Analyte	Sample Date	Result	QL	QL Unit	Trigger Level
HW08a	Lithium	1/25/2012	25.00 U ug/L	25	ug/L	31.00 ug/L
HW08a	Lithium	1/25/2012	200.00 U ug/L	200	ug/L	31.00 ug/L
HW08a_R2	Lithium	5/23/2012	25.00 U ug/L	25	ug/L	31.00 ug/L
HW08a-F	Lithium	1/25/2012	25.00 U ug/L	25	ug/L	31.00 ug/L
HW08a-F	Lithium	1/25/2012	200.00 U ug/L	200	ug/L	31.00 ug/L
HW08a-F_R	Lithium	5/23/2012	25.00 U ug/L	25	ug/L	31.00 ug/L

Sample Number – Code that is used to identify the particular sample. See additional information below:

HW## – Identifies the sample location and indicates that it was collected at well head or closest point to the well head.

F – Indicates that the sample was filtered following collection. The purpose of filtering the sample is to remove any particulates in order to find what metals are actually dissolved in the water sample.

Z – Identifies a duplicate sample. Duplicate samples are collected for every ten samples collected to test the reproducibility of sampling and analytical procedures.

P – Indicates that the sample was collected at the kitchen tap. In some cases this may be following any treatment that the residence may have.

A/B – Designates which residence the sample was collected for sample locations with multiple residences using the same water source (may be a well or a spring).

RO – Indicated that the sample was collected from a residence containing a reverse osmosis treatment system.

N – Designates that the sample was collected from the new well for locations with multiple wells.

_R2 - Designates samples collected during the second event (May 2012).

Analyte – General term for a substance in the sample. The lab does testing to find specific analytes, or substance in the water sample. The report lists each analyte that the lab tested for and what amounts were found.

Result and Units – identifies the actual result for the particular analyte and the measurement used for the particular type of sample. The results may include the following units for the various water sample analyses:

µg /L – Micrograms per liter (abbreviated as µg /L) measurements of the mass of the substance per liter of water. This measurement is commonly known as parts per billion or ppb. Drinking water results are usually reported in µg /L.

Trigger Level – established for this project, the trigger levels are based on risk-based screening levels and/or standards for public water supplies. A yellow highlighted result represents an analytical result greater than the established trigger level. Results exceeding a trigger level are referred to an EPA toxicologist for further review.

Validation Result Qualifiers - EPA performs a quality check on the lab results. After this quality check, EPA may mark the measurement of certain analytes with a qualifier to give additional information about the measurement. This information can apply to 1) how certain EPA is that the lab detected the analyte and 2) how certain EPA is of the measurement of the analyte once detected. If there is no qualifier by the result, the detection and measurement of the analyte are certain

U – Indicates that the analyte was not detected. If there is a number next to the U, this number is the amount of analyte that would have to be present to be detected by the lab given the particular method and/or instrumentation.

J+ - The result is an estimated quantity, but the result may be biased high.